PATENT

CONCRETE STONE,

F. RANSOME, Esq., C. E., LONDON,

FOR

BUILDING PURPOSES:

BRIDGES, GATE WAYS, MANTLES, VASES,

TILES, GRAVE STONES

AND EVERY VARIETY OF

ORNAMENTAL WORK.

Baltimore:

LUCAS & SON, PRINTERS, 19 SOUTH CALVERT STREET.

1866.

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F. RANSOME'S

New Patent Concrete Stone,

MADE WITHOUT BURNING.

For which the Commissioners for the Exhibition of 1862 Awarded the Prize Medal.

NATURE OF MATERIAL.

This remarkable material which is essentially different to any other which has yet been submitted to the public, and which can be produced in blocks or forms of any required dimensions, is suitable not only for the construction of solid masonry, but also for the manufacture of the most elaborate and delicate architectural embellishments.

It is composed of ordinary sand, chalk, or other mineral substance, firmly aggregated and cemented into a solid hard and indestructible mass by means of a siliceous cementing material, which by a subsequent simple operation is converted into an insoluble Silicate of Lime, possessing all the enduring properties of the Old Roman Concretes or Mortars, which have remained unchanged during a period of two thousand years.

PROCESS OF MANUFACTURE.

The process of manufacture is exceedingly simple, although based upon the most scientific principles. The sand, chalk, or other mineral substance is intimately mixed with its proper proportion of a solution of silicate of soda. This is effected in an ordinary pug mill, and the mixture which is thus rendered of a plastic consistence is either pressed into blocks or moulds, or can be rolled into slabs or forms as may be desired, and is afterwards either saturated with, or immersed in, a solution of chloride of calcium, when a double decomposition of the two solutions employed (viz: of the silicate of soda and of the calcium) immediately takes place. The silica combines with the calcium, and at once forms an insoluble SILICATE OF LIME, firmly enveloping and cementing together all the particles of sand, chalk, or other minerals of which the stone is composed, whilst at the same time the chlorine combines with the soda and forms chloride of sodium or common salt, which is easily removed by subsequent washing.

COST OF PRODUCTION.

The cost of production in plain blocks or slabs is less than that at which natural stone can be obtained, whilst for mouldings or other ornamental work, the additional labor in working the material is so trifling as scarcely to require notice; the principal item of

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expense in such work is the preparation of the necessary moulds, but as these may be made either of wood or plaster of Paris, they need by no means be costly, and where a repetition of the same article to any considerable extent is required, the proportionate cost of the mould chargeable upon each article would be inappreciable.

GENERAL ADVANTAGES.

Amongst the many advantages offered by the process, the following may be especially noticed :—

1st. The manufacture is exceedingly simple and inexpensive, requiring no large amount of outlay in the construction of plant, &c.

2d. The materials employed are for the most part of the commonest production of nature, and abound in almost every locality.

3rd. The stone can be immediately manufactured upon the spot where it is required to be used, and of the exact form needed, and this too at a smaller cost than natural free stone could be supplied even in a rough state.

It is equally applicable for solid constructive masonry, and for the most elegant and elaborate embellishments. In appearance and texture it so closely resembles the best descriptions of our natural stones, that it is next to impossible to distinguish between them, and it can easily be produced of any desired tone of color.

4th. No waste is incurred in the manufacture, and where desirable, in order to lessen the cost of carriage, the stones can be made hollow, as readily as solid.

5th. That whilst most of our natural building stones are rapidly acted upon by acid vapors and the atmosphere, particularly in the manufacturing districts, and in populous towns, to such an extent as to produce disfiguration and decay in a comparatively short period, the "Patent Concrete Stone " is not only totally unaffected by such influences, but gradually increases in hardness with the lapse of time ; and the opinion expressed by some of our most eminent chemists and geologists is " that Mr. Ransome has invented a material which, with the exception of the primary rocks, is better capable of giving permanency to external architectural decorations than any stone hitherto used."

6th. In point of strength the "Patent Concrete Stone" has been proved to be far superior to Portland stone or in fact to any of the natural stones with which it has been tested.

TRANSVERSE STRENGTH AND ADHESIVE POWER.

The following results were obtained in a series of experiments which were reported upon by Professor Ansted in a paper read by him at the recent meeting of the British Association held at Cambridge.

The TRANSVERSE STRENGTH was tested in the following manner:

	lbs.
A parallel bar of "Ransome's Concrete Stone," measuring 4ins. x 4ins. and resting upon iron frame, so as to bear 1 inch on the iron at each end, with 16 inches clear between the supports, sustained a weight suspended from the centre of.....	2,122

Whilst a bar of Portland stone of the same dimensions, and treated similarly, broke with 759½

The ADHESIVE POWER was proved upon pieces of stone notched for the purpose ; the sectional area of which at the weakest part was 5½ inches.

The specimen of Ransome's Concrete Stone sustained.....1,980

Whilst Portland stone, of same dimensions, and treated similarly, broke at.....1,104

Bath stone of same dimensions, and treated similarly, broke at..... 796

Caen Stone, of same dimensions, and treated similarly, broke at..... 768

A 4 inch cube of Ransome's Concrete Stone was found to sustain a weight of 30 tons before it was crushed.

The following passage is extracted from Professor Ansted's paper above referred to :—

"During experiments made in the laboratory on various methods suggested for preserving stone by a section of the committee recently appointed by the Board of works in reference to the palace at Westminster, Dr. Hoffman, Dr. Frankland, Mr. Abel and myself being members of this sub-committee, a very remarkable material was submitted by Mr. Ransome and experimented on to some extent.

"Dr. Frankland has since reported on this material. Its discovery arose out of the application of Mr. Ransome's method of preserving stone by effecting a deposit of silicate of lime within the substance of absorbent stones, Mr. Ransome saturating the surface with a solution of silicate of soda, and then applying a solution of chloride of calcium, thus producing a rapid double decomposition, leaving an insoluble silicate of lime within the stone, and a soluble chloride of sodium (or common salt,) which could afterwards be removed by washing. To prove that by this process a coating of hard silicate of lime was actually formed and deposited, as accoring to his theory it must be, Mr. Ransome made small blocks of various forms, in moulds, by mixing loose sand with the fluid silicate of soda, and then dipping the mass into the chloride of calcium. To the suprise probably at first of Mr. Ransome himself, but certainly of the chemists of the sub-committee, who performed the experiments in the absence of the inventor, there came out almost instantaneously a perfectly compact, hard, and to all appearance a perfectly durable stone. In such stones, at least, there seems to be no element of destruction.

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"It was evident that such a result could not be without consequences. So far as it bore upon the inquiry of the committee, it is alluded to in their published report. Many considerations connected with the nature and condition of natural stones liable to destruction by weathering, prevent an absolute decision without much previous experience. Mr. Ransome, however immediately patented his "Concrete Stone," and as an artificial stone, it deserves to be well known and thoroughly considered. It promises indeed to combine the advantages, and seems to show none of the disadvantages, of other artificial stones. It is made with rapidity, and is ready for use without drying or burning. So far as can be detected, it is subject to no injury from weather, and becomes, in fact, if made with sand, a true sand-stone cemented by silicate of lime, than which there is no better natural material; increased age only hardening all known silicates of lime, especially those formed from lime used as a mortar or cement."

Mr. G. R. Burnell, Civil Engineer, who also witnessed some experiments with the Stone bears the following testimony:—

"The samples I saw mauufactured before my eyes were rendered perfectly hard and resisting, and I have not the slightest hesitation in saying that I cannot see what would produce a change in the body of the stone.

"The results I witnessed was very remarkable. Some blocks were experimented upon by means of a bar with a cross beam, so that the weight acted to produce a cross strain, which was found to vary from 114 lbs. to 132½ lbs. per inch superficial, whereas Portland Stone broke with only 48 lbs. per inch superficial. Nor could it be said that these samples were at all favorable ones, as they had only been manufactured 25 hours before the experiments were made.

EXTRACTED FROM THE REPORT OF DR. E. FRANKLAND, F. R. S., &c., &c.

Professor of Chemistry at St. Bartholomew's Hospital.

CHEMICAL THEATRE, ST. BARTHOLOMEW'S HOSPITAL.
December 21*st*, 1861.

DEAR SIR:—I have submitted to experimental investigation the samples of stone forwarded to this Laboratory and have now to report as follows:

The experiments were made in the following manner. The samples were cut as nearly as possible of the same size and shape, and were well brushed with a hard brush. Each sample was then thoroughly dried at 212°, weighed, partially immersed in water until saturated, and again weighed; the porosity or absorptive power of the stone was thus determined. It was then suspended for 48 hours in a very large volume of each of the following acid solutions, the alteration in weight after each immersion being separately estimated.

The sample was then boiled with water until all acid was removed and again weighed. Finally it was dried at 212°, brushed with a hard brush and the total degradation or loss since the first brushing was ascertained. The following numbers were obtained:—

NAME OF STONE.	Porosity Per centage of water absorbed by dry stone.	Per centage alteration in weight by immersion in dilute acid.						Total per centage loss by action of acid and subsequent boiling in water.	Further loss by brushing.	Total degradation from all causes
		Of 1 per cent.		Of 2 per cent.		Of 4 per cent.				
		Loss.	Gain.	Loss.	Gain.	Loss.	Gain.			
BATH.....	11.57	1.28	....	2.82	....	2.05	....	5.91	.26	6.17
CAEN.....	9.86	2.13	....	4.80	....	.67	....	11.73	1.60	13.33
AUBIGNY.....	4.15	1.18	....	4.00	....	....	1.04	3.56	.59	3.85
PORTLAND.....	8.86	1.60	....	1.10	....	1.35	....	3.94	.24	4.18
ANSTON..... ..	6.09	3.52	....	3.39	....	3.11	....	11.11	.27	11.38
WHITBY.....	8.41	1.07	....	....	.53	none.	none.	1.25	.18	1.43
HARE HILL.....	4.31	.75	....	....	.60	none.	none.	.98	.15	1.13
PARK SPRING...	4.15	.71	....	....	.10	.15	....	.81	none.	.81
RANSOME'S PAT.	6.53	....	.95	none.	none.	none.	none.	.63	.31	.94

The numbers in the above table speak for themselves, and it is scarcely necessary for me to add, that whilst they point out the Portland, Whitby, Hare Hill, and Park Spring, as the natural stones best adapted to withstand the influences of town atmospheres, they also indicate that Ransome's Patent Concrete will be found equal to the best of these, and if the newness of Ransome's Stone (the specimen experimented upon not having been made a fortnight) be taken into consideration, together with the well known fact that its binding material, silicate of lime, becomes harder, and more crystalline by age, I am induced to believe that Mr. Ransome has invented a material, which, with the exception of the primary rocks, is better capable of giving permanency to external architectural decorations than any stone hitherto used. I should scarcely have imagined it possible that an artificial material could in so short a time and without any application of heat, have attained such weather-resisting powers. Its permanency, and the ease with which it can be moulded into any form, must give quite a new impulse to the external decoration of buildings. And in reply to your inquiry I beg to say, that there is nothing in the composition of your Patent Concrete Stone which would lead me to anticipate that it would suffer from exposure to the saline influences of the atmosphere upon the sea coast; on the contrary, I should think it peculiarly fitted to withstand such influences.

Yours, &c.

(Signed) E. FRANKLAND,

FREDK. RANSOME, ESQ.

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TESTIMONIALS IN FAVOR OF

MR. FREDERICK RANSOME'S

"NEW PATENT CONCRETE STONE."

ENGINEER'S OFFICE, WESTMINSTER BRIDGE,
23rd September, 1862.

DEAR SIR:

I have been much interested in your "Patent Stone," and in the mode of its formation, which is very philosophical indeed. The application can be of very wide circulation, not only in architectural but in engineering structures; and I anticipate that there will be an extensive demand for it when its properties are developed before the public.

Yours, truly,

FREDK. RANSOME, ESQ. THOS. PAGE,

2, QUEEN SQUARE PLACE, WESTMINSTER,
2nd October, 1862.

DEAR SIR:

In reply to your application to be furnished with my opinion of your "New Concrete Stone," I have much pleasure in saying that I believe it to be a material that when better known to the public, and its useful and economical character understood, will be generally used for building purposes.

I have, as you are aware, used it extensively upon the Metropolitan Railway, and should have been glad to have used it to a much greater extent, had you been in a position to supply it as quickly as it was required.

The time is at present too short to enable me to speak from actual experience as to its durability, but I like the present appearance of what you have done, and supported as it is by the high testimony of Dr. Frankland, I have every confidence in its lasting properties.

I am, dear sir, yours truly,

FREDK. RANSOME, ESQ. JOHN FOWLER.

TRINITY COLLEGE, CAMBRIDGE,
11*th October*, 1862.

DEAR SIR:

I have, during my recent residence at Norwich, watched the process by which you fabricate a stone of good color and well fitted for solid walls or delicate architectural decorations. The stone is hard and capable of resisting an enormous power of compression; this has been proved by experimental tests. The published documents sufficiently explain the process by which silicate of lime becomes a powerfully cementing principle in a siliceous sandstone.

From what I have seen of your "New Patent Stone," I believe that it will be strong and durable as the first-rate free stones found among the old strata of our country. This is my honest opinion, and I state it your request.

I remain, dear sir,
Very faithfully yours,

FREDK. RANSOME, ESQ. ADAM SEDGWICK,
(Woodwardian Professor of Geology.)

14, LINCOLN'S INN FIELDS, LONDON,
November 29th 1862.

DEAR SIR:

I have examined the process you employ in the fabrication of your "New Patent Concrete Stone," and the results which you have already succeeded in obtaining.

I found it to be exceedingly simple, and consisted in fact merely in the conversion of sand into a concrete body by the interposition of silicate of soda, which was at once converted into silicate of lime, by being immersed in a solution of chloride of calcium. The cementing material thus introduced is in fact the basis of the best hydraulic cements, and I cannot imagine a more complete method of securing its deposition.

The samples I saw manufactured before my eyes were rendered perfectly hard and resisting, and I have not the slightest hesitation in saying that I cannot see what should produce a change in the body of the stone.

The results I witnessed was very remarkable. Some blocks were experimented upon by means of a bar with a cross beam, so that the weight acted to produce a cross strain, which was found to vary from 114 lbs. to 132½ lbs. per inch superficial, whereas Portland stone broke with only 48 lbs. per inch superficial. Nor could it be said that these samples were at all favorable ones as they had only been manufactured 25 hours before the experiments were made.

I was indeed so much struck with the results of the experiments I witnessed that I have determined upon taking some shares in your proposed New Concrete Stone Company, and shall be happy to render my aid, and to co-operate as far as I am able in bringing so valuable a material prominently under the notice of the engineering and architectural professions.

Yours truly,

FREDK. RANSOME, ESQ. GEO. R. BURNELL.

3, STOREY'S GATE, WESTMINSTER, S. W.
November 28th, 1862.

DEAR SIR:

I am happy to comply with your request that I would make some

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brief remarks on your "Patent Concrete Stone." An examination of the specimens impressed on me so strongly with its probable value for building purposes that I felt desirous of further inquiring into the matter and of witnessing the process of its manufacture. This opportunity you were good enough to afford me, and I accordingly went down last week to visit your works. I saw the operation from beginning to end, and was much gratified, and not a little surprised at the result.

The raw materials employed, viz: sand, flint, caustic sodo, chloride of calcium and water, were rapidly converted into a hard and compact stone, fit apparently for any kind of building work, whether plain or ornamented.

The sand, rendered plastic by admixture with the solution of silicate of soda, takes the exact impression of the mould into which it may be pressed, and the subsequent process of hardening by saturating the mass with the solution of chloride of calcium is accomplished without producing the slightest flaw or distortion in the stone, hence, all kinds of finished ashlar work, mouldings, carved work, &c., are produced with ease and rapidity.

I witnessed in the daily course of work the manufacture of ornamented moulded massive slabs for tomb stones, coping stones for viaducts, and other smaller work. It was evident that, by selection of the sand, almost any color and any grain could be given to the stone at pleasure, whilst in strength and texture the stone appeared to me to be equal to the best building stones.

The question of durability is one which time and experience will settle. There seems, however, to be no reason for doubting the efficiency of the stone in this respect, judging from the tests to which you have exposed it, and from the samples of stone which have now for many months been exposed in your yard to all weathers. I could not detect in them any signs of disintegration.

I am unable of course to enter into the commercial part of the question, but looking to the simplicity of the process of manufacturing, I cannot help thinking that your stone will successfully compete with natural stones, even where these are plentiful and cheap, in all cases in which ornamental work is required, and that it will prove a most valuable substitute for ordinary stone used in large masses as in dock walls, &c., when the natural stone can be procured at a distance.

Believe me, yours faithfully,

FREDK. RANSOME, ESQ. EDWARD WOODS.

6, GREAT GEORGE STREET,
28th November, 1862.

DEAR SIR:

I have examined many specimens of your "Patent Concrete Stone," in the manufacture of which you appear to have attained to a very high degree of excellence.

In strength and in excellence of finish your manufacture compares favorably with most of the building stones. I think so highly of it that I am applying it as parapet coping, on a viaduct of considerable length in the vicinity of Dulwich, and do not believe it could be distinguished from sandstone of the very best quality.

I remain, dear sir,

Yours truly.

FREDK. RANSOME, ESQ. JOSEPH CUBITT.

IMPINGTON HALL, CAMBRIDGE,
2nd December, 1862.

DEAR SIR:

In reply to your letter requesting me to give a formal opinion of your "New Concrete Stone," I have much pleasure in repeating what I have already said at the late meeting of the British Association at Cambridge and elsewhere, namely, that I consider it to be the most ingenious and promising contrivance yet introduced to replace stone.

Manufactured with extreme facility and at a very small cost of almost any kind of material, capable of being made in any climate, and without needing more than a temporary shed for the manufacture of the largest quantity, I see no limit to its application. Moulded before manufactured to any shape with perfect ease, and neither contracting nor losing its sharpness of outline while being hardened, it seems to defy the competition of other material for perfection of form and cheapness. Its strength, both theoretically and by experiment, is fully equal to that of any ordinary building stone; and as for its durability, though no doubt it will require that to convince builders and architects of this, I really see no reason why it should not equal the very best and most durable of sandstones.

I can only hope that you may meet with the success you deserve introducing this important material into general use.

I am, yours, faithfully,

FREDK. RANSOME, ESQ. D. T. ANSTED, M. A., F. R. S.

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RECENT TESTIMONIALS

IN FAVOR OF

Ransome's Patent Concrete Stone.

Extract from a Letter to B. DONKIN, Jr. Esq., from R. BOWERY, Esq. Chief Engineer of the Bank Mill, St. Petersburg, Russia.

ST. PETERSBURG, *May 5th*, 1865.

"I have to-day examined the stones you made here, and find they are not injured by the severe frost and rain. I have kept them two or three days in a warm place, I then broke a piece off with a hammer, and they certainly appear stronger than when first placed in the window."

(*Note*—These pieces of stone were made by Ransome's Process, placed on a window sill out of doors in an exposed position. They were placed about August, 1864, and were, therefore, exposed to the heat of summer and to the intense cold of winter.)

"The piece in the wall near Mr. Z's I have examined and can find no change in it."

(*Note*—This was a piece of Ransome's Patent Concrete Stone, sent from London, about 10 inch square, and was built into a wall, leaving the whole surface quite exposed. The wall faced the North as it was considered by the architects that this was the most exposed aspect.)

Notes on the Summer of 1864, *and the Winter of* 1864 *and* 1865 *at St. Petersburg.*

Last summer was a very warm one, and the maximun temperature was 24° Reaumer = 86° Farenheit. The winter has been very severe. The thermometer was below freezing, with some exceptions, from the 1*st of October to the end of March*. During *the day*, the thermometer was often above freezing point, and at a guess there was probably more than 40 to 50 changes from freezing to thawing. The maximun cold was 23° Reaumer or 20° below Zero, Farenheit.

TAW LAW IRON WORKS, NEAR DARLINGTON,
March 22nd, 1865.

DEAR SIR:

I have not seen any ill effect from the frost upon the balustrade which you made for me in your Patent Concrete Stone, although the frosts have been severe, and the thermometer as low as 11 Farenheit in the day time.

Yours Very Truly,

FREDK. RANSOME, ESQ. CHAS. ATTWOOD.

12, ABINGDON STREET, WESTMINSTER,
April 5th, 1865.

DEAR SIR:

I have much pleasure in testifying to the very satisfactory manner in which the Patent Stone Pier-Caps for my bridges have withstood the frosts of last winter, and I shall continue to use the same material in other works under my charge.

I am, my dear sir, yours respectfully,

FREDK. RANSOME, ESQ. JAMES P. COOKE.

COUNTY LUNATIC ASYLUM, NEAR TOOTING, SURREY, S.,
21*st April*, 1865.

DEAR SIR:

I am glad to let you know that your Patent Stone for wall coping has stood the past winter remarkably well, and no appearance whatever of any deterioration by exposure to weather or frost; on the contrary, the material appears to harden rapidly. I know of nothing equal in durability and solidness for building or any purpose when strength is required to the Patent Stone you supply.—The coping of our large wall is the admiration of all who see it.

I remain yours faithfully,

FREDK. RANSOME, ESQ. S. BRIDGLAND, Steward, &c.

LONDON, CHATHAM, & DOVER RAILWAY. METROPOLITAN EXTENSIONS.

15, PARLIAMENT STREET, WESTMINSTER, S. W.,
18*th May*, 1865.

DEAR SIR:

I have, within the last few days, examined the coping of the viaduct of Herne Hill, supplied by you last summer, and find that the frost has had no effect on it. It is now in as perfect order as it was when first fixed, and both in color and texture is quite satisfactory.

I am, dear sir, yours truly,

W. H. THOMAS,

FREDK. RANSOME, ESQ. Resident Engineer.

GRUNDISBURG, WOODBRIDGE,
January 26th, 1863.

DEAR SIR:

The large stones you made for the bed of my thirty-horse engine in your new Patent Concrete Stone, turn out most satisfactorily. Nothing could answer the purpose better.

Faithfully yours,

FREDK. RANSOME, ESQ. W. COLCHESTER.

COLNEY PARSONAGE,
April 28th 1864.

Mr. Payne has much pleasure in stating that the window made of the Patent Concrete Stone, and which has now been put up a

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year, in Earlham church, is in every way satisfactory. Its appearance is quite equal to stone. He has such confidence in its durability, that were he now erecting a new church he would recommend the Patent Concrete Stone to be used.

FREDK. RANSOME, ESQ.

CHEMICAL MANURE WORKS, IPSWICH AND BRAMFORD,
June 8th 1864.

DEAR SIR:

In reply to your inquiry, relative to our experience of the Patent Stone slabs supplied to us some months since, I have great pleasure to report they appear completely to answer the purpose, and effectively resist the action of the acid and gaseous vapors which pass over them. I may add that I have previously tried thick slate slabs as well as lead and other materials, all of which proved perfectly useless, the lead going into holes within a week, and the slate becoming acted upon and broken; whereas your Patent Stone appears impervious and in as good condition as when put up.

This trial I think proves it a most desirable acquisition to Chemical Work generally, and I apprehend it may be much more extensively employed in my own works for lining shafts and other purposes.

I remain, dear sir, yours faithfully,

FREDK. RANSOME, ESQ. EDWARD PACKARD.

ST. PETER'S OIL MILLS, IPSWICH,
June 7th, 1865.

DEAR SIR:

The large stones you made for our oil presses have now been in use nearly three years, and answer the purpose extremely well.

We are, dear sir, yours truly,

FREDK. RANSOME, ESQ. GEO. MASON & CO.

ST. PETER'S IRON WORKS, IPSWICH,
June 7th, 1865.

DEAR SIR:

We fixed our steam hammer about 15 months since, upon some blocks of your Patent Concrete Stone. The hammer has since been in almost constant use, but the stone remains perfectly good and has not suffered in the least from the heavy concussion to which it is subjected.

Yours, dear sir, very truly,

FREDK. RANSOME, ESQ. E. R. & F. TURNER,

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12 PARK STREET, WESTMINSTER,
June 8th 1865.

DEAR SIR:

Having used your Patent Stone for the whole of the chimney stacks for the south wing of the Castle Hotel, Aberyswith, I have pleasure in stating that I have recently examined them and find

that they have withstood the effects of last severe winter in that most exposed position without any effect upon them that I have been able to discover

I am, dear sir, yours faithfully,

FREDK. RANSOME, ESQ. JOHN P. SEDDON.

8, ADAM STREET ADELPHI, W. C.,
June 14th, 1865.

DEAR SIR:

I have pleasure in stating that the panels of Patent Concrete Stone work supplied by you last year for the Duke of Cornwall Hotel, Plymouth, under my direction as architect, seem so far to have answered all our expectations; and that the result in another case of the exposure of some of this material to frost, and every variety of temperature for a much longer period, is equally unexceptionable.

I am, very faithfully yours,

FREDK. RANSOME, ESQ. CHAS. FOSTER HAYWARD.

8, ARGILE PLACE, REGENT STREET, W.,
June 15th, 1865.

SIR:

In reply to your inquiry as to my opinion of your Patent Concrete Stone now that I had had work executed in it, I can only state that after the experiments made, under my superintendence, for the Royal Institute of British Architects, 1863-4, I was convinced that if you could only insure the perfect penetration of your process it was worth a trial; from subsequent experiments I was convinced that you had completed this and I am perfectly satisfied with the work you have recently executed under my superintendence.

The blocks, some of which were 15-inch cubes (and many of which I tested,) appeared to be perfectly saturated with the solution, and although the work was fixed during the severe frost of last winter, and in a somewhat exposed situation, up to the present time they evince no sign of decay. I have the highest opinion of the invention and as as far as I have yet been able to judge, believe, that with your recent improvements in its manufacture, it will satisfactorily stand the atmospheric test.

I am, sir, yours very truly.

FREDK. RANSOME, ESQ. OCTAVIUS HANSARD.

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SCIENTIFIC REPORTS AND TESTIMONIALS

IN FAVOR OF

Ransome's Patent Siliceous Stone.

FROM PROFESSOR D. T. ANSTED, F. R. S.

"I am well acquainted both with the process adopted by Mr. Frederick Ransome in the manufacture of his Artificial Stone and with the material as prepared for the market in several forms. I have also paid considerable attention to the determination of its relative value as compared with other Artificial Stones, especially while acting as one of the Jurors for Class XXVII of the Great Exhibition. The method adopted in the manufacture is extremely simple and economical, involves few possibilities of error or accident, and is capable of indefinate extension by the outlay of sufficient capital. It is also perfectly successful in its adaption to required forms, the irregular contraction in drying and burning so inevitable in terra-cottas being provided against by care in the selection of sand in this composition. The material produced is a stone differing from all others, except the finest natural grits, in having a siliceous cementing medium quite as indestructible by exposure as the particles cemented together. In this respect it is both theoretically and practically superior to all natural grits except the very finest (such as Darley Dale and Craglcith,) being subject to no injurious action from frost, exposure to acid vapors, soot, ammonia, or other impurities present in the atmosphere of large towns. Owing to the possibility of so constructing the stone as to obtain almost any required degree of compactness or porosity, and any irregularity of composition, the material is adapted not only for floorings, chimney-pieces, ornamental house and garden work, and constructions generally, but also for filters, grind-stones, scythes-stones, and such like articles. I think it likely to be extensively used for such purposes when it can be supplied rapidly and in large quantities."

FROM T. H. HENRY, ESQ., F. R. S.

"I have examined the Artificial Stone of Mr. Frederick Ransome. It resembles in appearance and composition a sandstone of the best quality, being very similar in many of its properties to the celebrated Craigleith Stone. Its specific gravity in its dry state I found to be 2-471, and that of its solid particles 2 60; taken on the supposition that the water absorbed, when the atmospheric pressure is removed, completely replaces the air which before occupied its pores. [See the Report of Professors Daniel and Wheat-

stone, on the stones used in the building the New Houses of Parliament.] The absorbent power of the specimen examined was rather higher than that of the Cragleith, being 17 per cent. when saturated under the exhausted receiver of the air-pump, but lower than that of Magnesian Limestone; the Cragleith absorbing under these circumstances 14-3 per cent., and the Bolsover Moor Dolomite, the stone selected for the Houses of Parliament, 18-2 per cent. In order to ascertain its power of resisting the action of frost, I applied to it the test of Mr. Bard. (See "Annales de Chemie," vol. 38, and the report cited above.) It was well boiled in the solution of sulphate of soda, and exposed to its expansive force during chrystallization daily for a fortnight—the disintegration was *nil*. The highest authorities have considered this test as representing the action of the atmosphere during successive winters with great accuracy. This stone is not acted on by acids. It contains about 92 per cent. of silica, and is, in fact, a sandstone. the particles of which are united by a siliceous cement of the most indestructible character; and, judging from its chemical composition, I should consider it difficult to find a substance better adapted to the purposes for which it is intended."

The following Extracts are from the Minutes of Transactions of the Institution of Civil Engineers:

"The Rev. the Dean of Westminster had recently seen the process of manufacturing this Artificial Stone; and as far as a very rapid inspection enabled him to form an opinion, he felt great confidence in the result. His confidence in the durability of this Artificial Stone was increased by observing how evidently the process of its production was based upon the operations of Nature in the formation of rocks. He thought the process under discussion was of considerable importance in every point of view, and merited the best attention of the engineer and architect.

"Sir H. D. De la Beche could add but very little to what had been observed with respect to the process. It was clear that the substance produced greatly resembled a compact sandstone, and its durability would be exactly in proportion to the hardness of the aggregated particles and the resisting quality of the cementing medium, presuming it to be intimately mixed and in due proportion. Now, as a siliceous cement was the most enduring, there was no reason why the result should not be the production of a substance, very nearly indestructible from any ordinary action to which natural stone would be subjected, with this advantage, that in its plastic state the Artificial Stone could be moulded to various forms, which could only be given to natural stone by the expensive process of carving. This adaptation of chemical knowledge to mechanical art was deserving of all praise, and he was of opinion the process was a great desideratum.

"Mr. Walker was much pleased with the external appearance of the Artificial Stone, and of the texture of the fractured substance. Some of the specimens were stated to possess a specific gravity

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equal to granite. Now, if, at the same time, it were equally non-absorbent, there could be no doubt of the value of the production. It appeared from inquiries he had made from Mr. F. Ransome, that the price of the Artificial Stone would not much exceed that of Bramely Fall stone.

"Mr. R. Phillips said he had also made some experiments upon the chemical nature of the Artificial Stone; and suspecting that a portion of the alkali might be uncombined, he reduced a piece of the substance to powder, expecting that he should have detected the presence of the alkali; such, however, was not the case. He went further, and tried the powdered substance in heated acid; but without producing anything like decomposition. He was therefore of opinion, that any substance, in which silica and alkali were so intimately combined, would require the action of ages upon it to produce any apparent decomposition or alteration of form.

"Dr. Farrady said this substance appeared to be a collection of particles of sandstone grit, intimately combined with the silicate of soda, by whose tenacious properties, when fused, they were held together, as by a kind of glass, enveloping the particles. It was essential to keep this in mind in arguing on the properties of the substance, and it would be very desirable to ascertain the effect of boiling it in water for a length of time, and then of exposure to frost and other changes of temperature. It was evidently a very strong, and apparently durable substance, and he conceived would be used for many purposes.

"Dr. Garrod said he had examined Mr. Ransome's process with great care. The chemical nature of the Artificial Stone had been so well described, that it was useless to recur to it, beyond observing, that an almost indestructible cement was used for the aggregation of the particles, by the combination of the silica and the alkali, and, if properly proportioned, and indissoluble glass would be formed in the process of baking, which would not only hold the mass together very firmly, but by enveloping each particle comprising it, would afford protection against injury from any fluid, or the air, between the particles. Among other trials to which the Artificial Stone had been subjected, a piece weighing, when dry, 347 grains, was immersed in hot water during 160 hours; for 60 hours of which the temperature was kept up to the boiling point; it was then taken out, dried and weighed, and was found not to have lost anything of its weight, nor could the slightest trace of alkali be discovered in the water that had been used. This experiment was, he thought, conclusive as to the probable effects of moisture and of the atmosphere. Vases and other vessels formed from the Artificial Stone had been filled with water, which had been allowed to freeze in them, without producing any injurious effect, either by bursting the vessels, or by chipping portions from the surface, as so frequently occurred with carved natural stones."

ON ARTIFICIAL STONE,

WITH SPECIAL REFERENCE TO THE

Patent Concrete Stone of Mr. Ransome:

A Paper Read at the Meeting of the Liverpool Architectural Society,

BY G. M. WILLIAMS,

DECEMBER 27th, 1865.

It has long been an object to discover the means of producing a material for architectural ornament, which, while possessing the durability and effect of carving in the best descriptions of natural stone, should be available at such a price as to make the introduction of rich ornament practicable in cases where the cost of the labor of the mason upon real stone would prevent the use of it.—Various attempts have been made to produce artificial stone of such a nature as to admit of being moulded, whilst in a plastic state, into such forms as might be desired, and retaining that form, with the requisite properties, on the completion of the process of manufacture.

Roman and Portland Cements, which may be considered a species of artificial stone, have long been used as affording a cheap, though (as all professional men are agreed) an unsatisfactory substitute for real stone, and it is only the moderate cost at which elaborate architectural ornament can be produced in this material that has led to its extensive use for such purposes. It is indeed in form only that it can be considered as an imitation of the product of our quarries, for in texture there is little resemblance, and the most superficial observer will at once detect the absence of reality.

Very large blocks of concrete, formed of gravel, sand and Portland Cement, and cast in moulds into the required shape, have been used for dock and pier works, but these may be considered rather as a substitute for stone than stone itself, and at any rate are unsuitable for architectural ornament. Austin's artificial stone which has been in use about fifty years, is another more stone-like imitation of nature, but it is I believe, only sand or gravel worked up with cement, though so skillfully manipulated as to give a better result than mere ordinary cement. Its use however has been

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chiefly confined to the making of vases, statuary, and the like.—Terra Cotta may also be considered as a kind of artificial stone, though bearing still less resemblance to natural stone than any other; and though capable of being moulded into a variety of forms of ornament, the great liability to distortion in burning, the complete absence of all appearance of natural stone, and the too general liability to suffer from frost, must always tend to make its use objectionable. The first imitation of natural stone which can be considered worthy of the name, was Ransome's Siliceous Stone, patented just twenty-one years since. This substance is in reality a sandstone in which particles of siliceous sand are firmly cemented together by an insoluble glass, produced by the action of heat on the material used. It is very hard, uniform in texture, and not in any way liable to injury from atmospheric influences. In external appearance it greatly resembles natural sandstone, but in the fracture the vitreous cement uniting the particles of sand shows it to be of a different character. It has been made to a considerable extent, but is somewhat expensive, and like Terra Cotta, is open to objection on account of its liability to distortion in burning. I will not go into the details of the composition and manufacture of this article, ingenious as they are, and reflecting the highest credit on the inventor, Mr. Ransome, for it may now be considered as superseded by the more recent discovery of this most able and energetic man. I refer to his Patent Concrete Stone. It is to all intents and purposes a genuine sandstone, and, as an imitation of nature, is so true as to defy detection by the most practised eye,—The discovery is recent, the patent dating 1861, and originated in the endeavor to devise an efficient mode of checking the decay going on in the stone used in the construction of Westminster Palace. You are aware that the various sandstones used in building consist substantially of particles of quartz, united by either a calcareous, a siliceous, or an argillaceous cement, or by one consisting of a compound of these varieties, and consolidated by pressure. The Craigleith stone, well known to you for its excellence, has its particles united by a calcareo-siliceous cement, while the stones of Hollington, Park Spring, Darley Dale, and Talacre, also well known to you have an argillo-siliceous cement.

The new Patent Concrete Stone consists of sand, having its particles united by a calcareo-siliceous cement. It is formed by the mixture of clean sand with a proper proportion of silicate of soda or potash in solution, a small quantity of finely-ground limestone being added to aid in filling the interstices between the grains of sand. The materials, being intimately mixed in a pug mill, form a paste sufficiently plastic to admit of being pressed into moulds. On being taken out, a solution of chloride of calcium is applied, when a double decomposition immediately takes place between the two solutions. The silica and lime combine and form an insoluble cement, firmly adhering to and uniting the particles of sand, whilst the chlorine and soda or potash go together to form a chloride of

sodium or potassium, which is subsequently removed by washing. The application of the chloride of calcium is continued until the stone is penetrated throughout by it, and the whole of the silicate of soda decomposed. The stone is then placed in a tank of chloride of calcium heated to the boiling point of water, and is then complete, requiring only to have the salt washed out of it to make it fit for use. I have stated that this stone cannot be distinguished from natural stone in its texture, and in proof of this fact I appeal to the specimens before you. In strength it exceeds the several building stones in use in this district, and in the sharpness of outline and accuracy of finish, which can be given to it, no natural stone can at all compare with it. The most important point of all, however, is *durability*, the power of resisting atmospheric influences The invention is yet too new to allow of my appealing to the test of time in favor of this material, but as far as an opinion can be formed from present experience, and from analogy, everything indicates that this stone will prove equal in durability to the best sandstones, and superior to most of them. Of course I say this on the assumption that justice is done in the process of manufacture, for in this, as in any other case, work may be well or ill done; and I freely admit that there have been cases in which, in the early periods of manufacture, this stone has failed, both in Mr. Ransome's hands and my own. It will be readily understood that the process was not perfected at once, and that failures in the first instance were to be expected, as different materials require different management, and these details can only be ascertained by trial. Mr. Ransome, in his wish to get the stone introduced, was perhaps a little premature in undertaking work before he had fully mastered all difficulties of manufacture, and in this way some disappointment was at first caused; and even in this neighborhood. interested parties have not hesitated to take advantage of an early failure to represent this stone as worthless, and have exhibited a specimen of some of the earliest stone produced by Mr. Ransome as a sample of the present manufacture. Failures of this sort may, in some measure, resemble those which are so often seen in natural stone, and may arise from similar defects in composition; but the Patent Concrete Stone of Mr. Ransome possesses this great advantage, that when once the nature and properties of the materials at command are properly understood, the most complete success can easily be insured. It is indeed remarkable how few of the natural sandstones can be fully depended upon for durability, and what great differences exist between specimens even from the same quarry. The pages of the Report of the Commission appointed to inquire as to the best stone to be used for the new Houses of Parliament, made in 1839, bear ample testimony to these facts; and after all the anxious care and labor bestowed upon the investigation by the eminent men to whom the duty was confided, how melancholy is the result of the adoption of their recommendation. It will be found that there are few, if any, of the natural

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building stones but contain some ingredient constituting more or less an element of decay; and I cannot but think that the time will come, if it has not already arrived, when, by avoiding these elements, we shall possess an artificial stone more durable than most, if not all, of the natural sandstones. The grains of quartz constituting the main substance of these stones may be considered as imperishable; it is the other ingredients, and especially defects in the cementing substance, which constitute the causes of decay. In the formation of the artificial stone, if care be taken to select a pure quartz sand—if the materials constituting the calcareo-siliceous cement be properly prepared—and if the manipulation be carefully and correctly managed, there is much stronger ground for confidence in the result, than when we take stones from many of the quarries out of which costly buildings are yearly erected; though experience shows that in numerous cases they will inevitably exhibit unmistakable symptoms of decay within a few years, and in some instances, even before the scaffolding has been removed. In connection with the subject of decay in natural stone, it may not be out of place here to refer to the application of the same chemical principle as that by which sand is concreted into the hard stone before you, to the protection and binding together of the particles of natural stone when its surface is in a perishing state. The indurating process, patented by Mr. Ransome, is the same in effect. A solution of silicate of soda is applied to the surface, and absorbed by the pores of the stone. This is followed by the application of the solution of chloride of calcium, when the double decomposition takes place, as in the artificial stone, and solid insoluble silicate of lime is deposited in the pores of the stone, which, by firmly adhering to the several particles, imparts much additional strength, and renders it much less absorbent than before, thus effectually protecting it from injurious atmospheric influences. I have found that the Concrete Stone, by being merely brushed over with the two solutions, may be rendered almost impervious to water; and, as an instance of what may be done by a careful application of the solutions, I may mention that about two years since Mr. Ransome was engaged with some experiments in making Concrete Stone Pipes, with a view to their being used for the conveyance of water under pressure. The pipes made for these experiments were of short length (I think about a yard,) of 8½ inches internal diameter, and 1⅝ inch thick. They were carefully indurated, and then tested with water under hydraulic pressure. They were so *completely impervious*, and such was their strength, that several of them sustained a pressure of from 100 to 120 lbs. per square inch before they burst.

It must be obvious that an application capable of so completely excluding gases and moisture, the two great elements of destruction, must be powerfully efficacious in preventing the decay of stone, and therefore very valuable in cases where walls built either of bricks or stone of a very porous nature, admit moisture through

their substance. The great strength which may be given to this stone, as in the case just mentioned, shows it to be as well suited for those purposes in which that quality is an object as it is for those in which sharpness of outline and accuracy of finish are required, as in the case of balustrading, capitals of columns, and all the higher class of architectural ornament. Looking at the many advantages possessed by this material, I feel justified in expressing the belief, that when more known, and appreciated as it deserves, it will come into very extensive use, and in the Metropolis, where it has been known for a longer time than here, the application of it is already becoming so extensive, and the demand so far exceeds the present means of production, that land has been secured, and plans are now being prepared, for the erection of works of several acres in extent, for the production of Ransome's Patent Concrete Stone, in the immediate neighborhood of London.

I have gladly availed myself of the opportunity of bringing this subject under the notice of your Society, because, quite independent of the interest I have myself in making it known, I feel that it is one of so much importance and interest to the profession, that I hope you will all consider a little time well bestowed upon it.

Appended are the Results of Trials of the Strength of the

PATENT CONCRETE STONE, Manufactured by G. M. WILLIAMS,

Hale Cliff.

Comparative trials of the strength of the above Stone, and of some of the natural Stones in use for building in the Liverpool District, were made October 1, 1864, at Hale Cliff, in the presence of several of the Architects of Liverpool, and other gentlemen.

The blocks of Stone used for testing the *Transverse Strength* were 4 ins. square and 18 ins. long, and were supported upon bars an inch from each end, giving a bearing of 16 ins., and the weight was applied at the centre.

The pieces used for testing the *Adhesive Power* were bars having a sectional area of 5½ square inches, with projections at the ends to allow of their being torn asunder.

The comparison between the natural and artificial stones, as to their power of absorbing water, showed that there was little difference, the artificial stone, made with coarse sand, taking up about the same quantity of water as the coarse-grained natural stone, and that made of fine sand, taking up about the same as the fine-grained natural stones. The water absorbed ranged from 12½ per cent. taken up by the coarse-grained stones, to 6¼ per cent. taken up by those of fine grain. The stones were all thoroughly dried before being placed in water.

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TRIALS OF TRANSVERSE STRENGTH, SHOWING THE BREAKING WEIGHTS.

Red Sandstone, 16 ins. clear, 4×4	Stourton, 16 ins. clear, 4×4	Minera, 16 ins. clear, 4×4	Cefn, 16 ins. clear, 4×4	Patent Concrete, 16 ins. clear, 4×4
10 cwt.	7 cwt.	Coarse 7cwt.	12½ cwt.	12 cwt.
This stone was from	6½ "	Fine 8 "	12½ "	11½ "
Woolton Quarry, and	.....	.....	.....	15 "
had been exposed to the	.....	.....	.....	12 "
air for many years.....	.....	.....	.....	
Average.....	6¾	7½	12½	12⅝

Two other blocks of a fine grained heavy stone of the same dimensions, supposed to be from Yorkshire, broke at 17½ and 21¼ cwt.

On 26th November, a further number of the blocks of the Concrete stone of the same size were tested, when the breaking weights ranged between 11 and 14¼ cwt. Two similar blocks, made of the sand now (December, 1865) used at the Hale Cliff Works, were lately tested, and the breaking weight was 16¾ and 17¼ cwt.

Four blocks of the Concrete Stone, of the same size, of the quality prepared for Filters, very open and porous, were tested, and the breaking weights were 9¾, 9¾, 9, and 11 cwt.

TRIALS OF THE ADHESIVE POWER, SHOWING THE BREAKING WEIGHTS.

Sectional Area, 5½ Square Inches.

Stourton,	Minera,	Cefn,	Patent Concrete,
under 3½ cwt.	under 3½ cwt.	5¼ cwt.	4¾ cwt.
		7½ "	9 "
		.....	5 "
This was the smallest weight which the arrangement of the machine admitted of applying, and on trial it was obvious that this was considerably more than either stone would bear.		.....	5¾ "
		.....	5¾ "
		.....	7½ "
Average.....		6⅜	Over 6¼ cwt.

TESTIMONIALS

FROM THE

BALTIMORE PAPERS,

IN FAVOR OF RANSOME'S PATENT CONCRETE STONE.

FROM THE BALTIMORE SUN.

A New Branch of Baltimore Industry—Ransome's Patent Stone.—A number of gentlemen of this city are at present engaged in organizing a Joint Stock Company for the purpose of manufacturing plain and ornamental stone under Ransome's English Patent. They have already purchased the right for the State of Maryland, and yesterday books of subscription to the capital stock of the Company were opened at the North-east corner of Calvert and Saratoga streets, where a considerable amount of the stock was subscribed for. A number of business and professional gentlemen were present for the purpose of witnessing the process of manufacture, and all were apparently delighted with its simplicity, as well as with the rapidity with which common sand was turned into most durable stone; a stone at once rivaling in every respect the best natural sandstone now known, and apparently superior to nearly all in its great powers to resist the extremes of heat and cold and in its entire freedom from cracks or flaws. The material of which "Ransome's Concrete Stone" is composed is ordinary sand, chalk or other mineral substance, firmly aggregated and cemented into a solid, hard and indestructible mass by means of a siliceous material, which by a subsequent very simple operation is converted into an insoluble silicate of lime, possessing all the enduring properties of the old Roman concretes, or mortars. The process of manufacture is remarkably simple, yet it is based upon the most scientific principles. The sand, chalk or other mineral substance is intimately mixed with its proper proportion of a solution of silicate of soda, by means of an ordinary pug-mill. The mixture is thus rendered of a plastic consistency, when it is either pressed into blocks or moulds, or rolled into slabs or any form that may be desired and is then either saturated with, or immersed in, a solution of chloride of calcium, when a double decomposition of the two solutions employed immediately takes place. Thus is formed an insoluble silicate of lime, firmly enveloping and cementing together all the particles of sand or other minerals of which the stone is composed. The cost of production is said to be

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less than that at which the natural stone can be obtained. The stone proposed to be manufactured by this company has stood the severest tests—a parallel bar measuring four inches by four sustaining 2,122 pounds, whilst a similar bar of Portland stone broke with 759½ pounds. In another case the stone stood a pressure of 1,980 pounds, whilst the Portland stone broke at 1,104 pounds, the Bath stone at 786 pounds, and the Caen stone at 768 pounds. It is claimed for the Concrete Stone" that it combines the two elements of durability and cheapness. They are represented as rapidly growing in favor in England, where they are coming into general use, and where companies have been formed for manufacturing them on a large scale. They have received strong testimonials from Dr. Frankland, one of the Committee of the Board of works, appointed by Parliament; Prof. Ansted, a member of the British Association; John Fowler, engineer of the Westminster Bridge, and many others of scientific fame, both in Europe and this country. The new Company proposes to go into the manufacture of the "concrete stone" on an extensive scale, and thus will be added a new and important branch to the manufacturing and industrial pursuits of Baltimore.

FROM THE BALTIMORE GAZETTE.

Ransome's Patent Stone.—There is at this time a Company in process of organization in Baltimore, for the purpose of manufacturing plain and ornamental stone under Ransome's English patent, which is also patented for the United States. After a series of experiments covering a period of twenty years, Mr. Ransome has been enabled to produce a stone rivaling in every respect the best natural sandstones now in use, and superior to all or nearly all in homogeniety of structure; in its powers to resist the extremes of heat and cold, and in its perfect freedom from cracks or flaws.

The most remarkable thing about this discovery, next to the cheapness of the materials employed, is the simplicity of their manipulation. The materials consist of clean, dry sand, flint or quartz reduced to a semi-liquid substance of the consistence of a light syrup or molasses, and chloride of calcium—the latter being the refuse left in the manufacture of soda.

The rapidity with which this stone can be manufactured constitutes, perhaps, the most singular feature of all. Within the space of five minutes the sand can be taken from the loose heap and converted into a small block or slab of stone, which is so hard and compact that it will ring under the hammer. The whole process of conversion is one that any intelligent man can learn in the space of a few hours. The dry sand is put into a pug mill, a small proportion of the silicate of soda, in solution, is added to it, and the two ingredients are intimately mixed together until the

soluble silicate is so perfectly diffused throughout the mass that the latter will cohere when its particles are pressed together in the hand. This plastic sand is then transferred to moulds of any size or form, into which it is firmly rammed by hand. As soon as this operation has been completed, the article thus moulded is laid upon planks and is watered with a saturated solution of chloride of calcium, when by the action of the calcium upon the silica the process of induration commences, and in a few minutes the moulded article is converted into solid stone. Every species of plain and ornamental work, from a monolithic column to a house shingle may thus be formed—the largest pieces of stone yet made occupying in the hardening not more than forty-eight hours; the smallar ones but a few seconds. A statue, or block for paving, the most intricate gothic tracery for church or domestic architecture, a bed stone for an engine, rustic work, balustrades, mantlepieces, vases, cornices, brackets—in short everything that tasks the skill of the stone-cutter may be moulded with equal facility. What, perhaps, will be regarded as equally important, any form that may be desired can be given to this stone, whilst the price at which it can be sold, ready prepared for the builder, will be but little, if any, in excess of what the finer qualities of sandstone would cost taken rough from the quarry. This stone combining, as it does, the two elements of durability and cheapness, is rapidly growing in high favor in England, where companies have been formed for making it on a large scale. It has received the strongest testimonials from men of the highest scientific attainments, such as Dr. Frankland, one of the Committee of the Board of Works, appointed by Parliament, and Professor Ansted, a member of the British Association, and from a large number of the most eminent builders and civil engineers. The tests which they have applied have been thorough and exhaustive.

The owners of the right for this State are now organizing a Company to bring this stone into general use among us. Books for subscription to the stock of the Company will be opened tomorrow at the north-east corner of Saratoga and Calvert Streets, where also any person desirous of witnessing the process of manufacture, is invited to call.

FROM THE EVENING TRANSCRIPT.

Artificial Stone.—We call the attention of our readers to the advertisement in another column of Ransome's Artificial Stone. We do not hesitate to say that this is one of the most valuable inventions ever offered to the public, and one which is destined to have a wonderful effect upon architecture.

The subject is one to which Mr. Ransome, an Englishman, has devoted many years of an active life. After numerous experiments, he finally fixed upon the process which he has now adopted,

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and which seems to be as near perfection as man is ever destined to come. Without the use of heat or forcible pressure, he has succeeded in converting sand into a hard, solid, consistent stone, of firm texture and great powers of resistance to the ordinary atmospheric influences.

The process is one which cannot fail greatly to interest every intelligent man, and we advise our readers to visit the establishment, at the northeast corner of Calvert and Saratoga Streets, where it is now on exhibition. There they will see ordinary sand dampened with a simple chemical, which can be procured in great abundance, and at a trifling cost, forced up into all the inequalities of a mould, by the mere pressure of the hand, so that it faithfully reproduces all the minutest details of the model. From this it is removed, without disturbing any of the delicate tracery so impressed upon it, and transferred to a block of stone. Over its face is now poured another chemical solution, and the surprised spectator sees the loose sand turned into solid stone. In a few minutes it rings under the trowel like a piece of well burned brick.

The whole action depends upon the different relations of silica to the alkalies and the earths. With soda or potash this substance can be made to form a soluble compound, resembling though not identical with, that vended under the name of soluble glass, It is evident that this would not answer the purpose of architecture, because, being soluble, it would be washed out by the rain, and the stone formed of it would crumble away. So the patentee takes advantage of another property of silica, that mainly of forming with the earths an insoluble compound. All that is necessary is to introduce between the pores of the sand, now occupied with the soluble silicate of soda, an equally soluble salt of lime Chloride of calcium being a residue of certain chemical manufactures, and therefore cheap, it being also extremely soluble, has been chosen for this purpose. As soon as it comes in contact with the silicate of soda a double decomposition at once occurs; silicate of lime is formed and remains between the pores of the sand, binding the grains together with a cement of insoluble glan, while commom salt, another result of the change, can be washed out with water.

Experiments extensively tried in England by the ablest chemists, architects and engineers of that country have proved that this stone is stronger than any of the natural free stones employed in Great Britain, and less liable to be injured by the weather. This results from the fact that all these natural stones are just such a compound as this, being made up of sand of varying degrees of fineness cemented together, but that this cement is not always so firm and insoluble as that employed in this artificial product. The atmosphere of London is a particular severe test of the cahracter of building materials. The enormous quantity of coal and coal-gas consumed in that huge metropolis fills the air with contamination, one of the most injurious of which is sulphuric acid. This brought down by the rains of that humid climate, insinuates itself

into the pores of the stone and then attacks and destroys the cement which holds the particle together. Then the stone crumbles or rots. The consequence is that many of the most valuable buildings in London are seriously disfigured. The new Parliament Houses have had much of their delicate carving destroyed in this way, and in many places unsightly holes are eaten in the face of the blocks of stone.

Another difficulty about the natural building stones is, that they are often laminated in structure. In such cases, the rain insinuates itself between the laminæ, and should a frost come, the sudden expansion splits the stone, and its surface scales off. This may be often observed upon brown-stone fronts. The artificial stone, however, being uniform in its texture, is subject to no such accident.

It is difficult to imagine a greater boon to architecture than this. A man may be miles away from any deposit of building stone, but if he can only get sand and these two chemicals we have named, he can erect himself a house that could challenge comparison with the most elegant edifices of the richest and most luxurious cities.

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Scientific Reports and Testimonials

IN FAVOR OF

RANSOME'S PATENT SILICEOUS STONE.

No. 59 South Gay Street,
Baltimore, February 12th, 1866.

I have witnessed the manufacture of the Artificial Stone made by Mr. Ransome's process; have carefully examined the chemical principles involved, and have annalyzed samples of the articles made by it, both here and in England.

I have no hesitation in saying that this is a genuine stone of the first quality. It is a perfect imitation of nature's best results. The various substances employed in architecture under the names of sandstone, freestone, &c., are all formed of grains of sand or minute fragments of other mineral, agglutinated by a cement. This binding material is sometimes an oxide of iron; at others a carbonate of lime; and again, silica or some silicate. Of these the two former are much more subject than the last to the wasting action of the vicissitudes of the season, and of the chemical reagents introduced into the pores of the rock by rain water. The results of those destroying agencies are seen in the scaling off of the stone, or its wearing into irregular cavities. Stones with a siliceous cement, however, are remarkable for durability.

It is this last variety which has been so successfully imitated in the new article. The sand, having first been mixed with an alkaline silicate, is then treated with chloride of calcium. Double decomposition ensues, and a silicate, of glassy hardness and imperviousness coats every grain and binds the whole into one solid mass. Such a stone carefully made may be considered proof against all ordinary atmospheric influences.

The stone made in this country I consider fully equal to that brought from England. The results of analysis of the two are almost identical. In physical structure I can detect no difference

A. SNOWDEN PIGGOT, M. D.,
Analytical and Consulting Chemist.

Office No. 26 North Charles Street,
Baltimore, February 21st, 1866.

Richard J. Worthington, Esq.

Dear Sir:—At your request we have examined the "Concrete Stone," made under the patent of F. Ransome, Esq.; have witnessed the process of manufacture, and have submitted specimens to very severe tests. Some we have boiled for a considerable time, and transferred immediately upon ice, until the water absorbed was frozen. Others we have placed in the fire until heated to redness, and then immersed in ice water. We have subjected them to alternations of heat and cold in various ways, and find the specimens as perfect after the test as before the experiments were made.

As the results of our tests have proved so entirely satisfactory, we have no hesitation in recommending it as a most valuable building material. In its finished surface, and in the appearance of the fracture, it resembles the finest quality of natural sandstone, and we believe it will be equally as durable. Taking into consideration the facility with which it can be produced in almost any locality, it cannot fail to be a valuable article for building purposes, and one which we hope to see brought into general use,

Very respectfully, &c.,

Faxon and Ellicott,
Architects and Engineers.

New York Hotel, *March*, 15*th* 1866.

Messrs. Marye and Meade,

Gentlemen.—I am deeply obliged to you for the specimens of "Ransome's Artificial Stone," which you have recently brought to my notice, as well as for the descriptive pamphlet, and the testimonials of the highest scientific and practical English authority which accompanied them.

The material formed by Mr. Ransome's process promises to be of most especial value for use in the Atlantic States. So far as my knowledge extends, it is a fact that the strata from which the building stones of the finest structures of the Old World have been supplied, are altogether wanted east of the Alleghanies, at least in the geological formations of America. This natural deficiency, Mr. Ransome's surprising invention now seems to enable us to supply with ease and certainty, and at a comparative trifling cost. I shall look with the highest interest for its application in practice, and assist in such application to the extent of my ability, and in works under my own charge. If I do not greatly misunderstand the scope of the high testimony adduced, we are now enabled by

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this process to form a hard and permanent siliceous sandstone in the forms required for final use, precisely in the same chemical combinations in which Nature, in the lapse of by-gone ages, produced the original stones, but under conditions of choice selections of material and scientific accuracy of combination, such as the accidental process of natural deposition could not have been expected fully to secure. The result is of course a material possessing all of the excellencies, and none of the fortuitous defects of the finest building stones used in the great architectural masterpieces of the world; and this, too, without the expense of quarrying them in the rough, and afterwards working them by the slow and expensive outlay of manual labor required for their elaboration. I have been so much delighted with the beauty of the specimens submitted, and so thoroughly impressed with the immense, almost incalculable value of this new material to the architects and builders of this country, that I cannot refrain from sending you this full expression of my own opinion on the subject.

Very truly yours,

(Signed) ARTHUR GILMAN,

One of the Architects of City Hall, Boston, and of the Grand Hotel, Central Park, New York.

BOSTON, *March* 13*th*, 1866.

G. I. F. BRYANT, ESQ.,

Dear Sir:—I have made an examination of "Ransome's Patent Concrete Stone," which you brought me, and find that its absorbent power for water, when treated first in vacuo and then under atmospheric pressure under water, is on three trials per cent:

15.65
15.70
16.04

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3)47.39

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mean of the 15.79 three trials.

Mr. T. H. Henry's sample gave 17 per cent. as the quantity of water absorbed, so the samples I operated upon are better than his. Since it is as firm as any sandstone used in this country and possesses no more absorbent power, it seems to me to be suitable for any exposed ornamental work on buildings. Mr. Henry's test by sulphate of soda having shown no disintigration will take place from frost, I think you may safely adopt this cement stone in architecture as you have proposed for exterior as well as interior parts.

Respectfully, your obedient servant,

CHARLES T. JACKSON, M. D.,

State Assayer to Massachusetts.

N. B.—The length of time of immersion of my specimens in water, after the removel of air from the pores, was twenty-four hours.

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